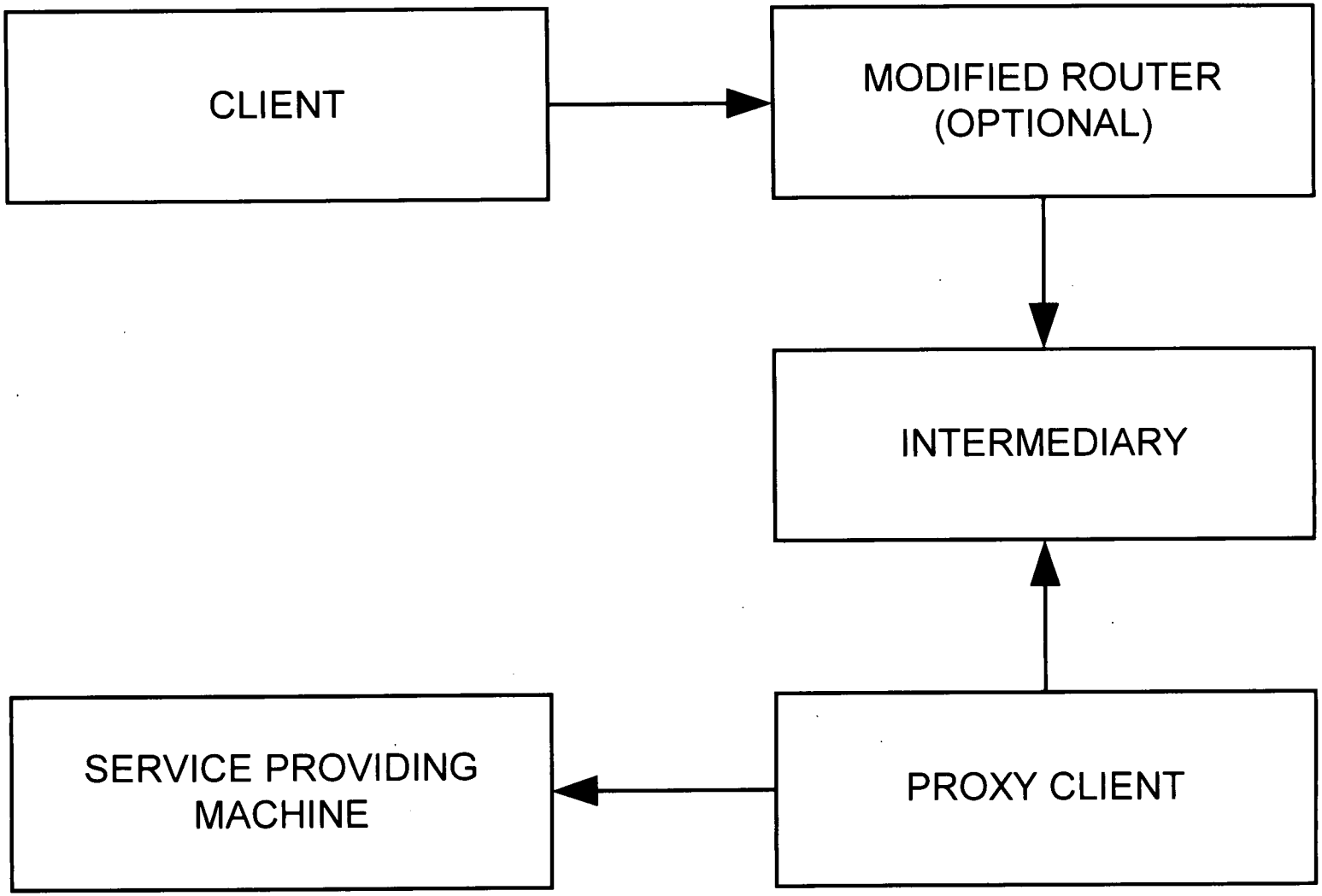
CLIENT
MODIFIED ROUTER
(OPTIONAL)
INTERMEDIARY
SERVICE PROVIDING
MACHINE
PROXY CLIENT

FIG. 1

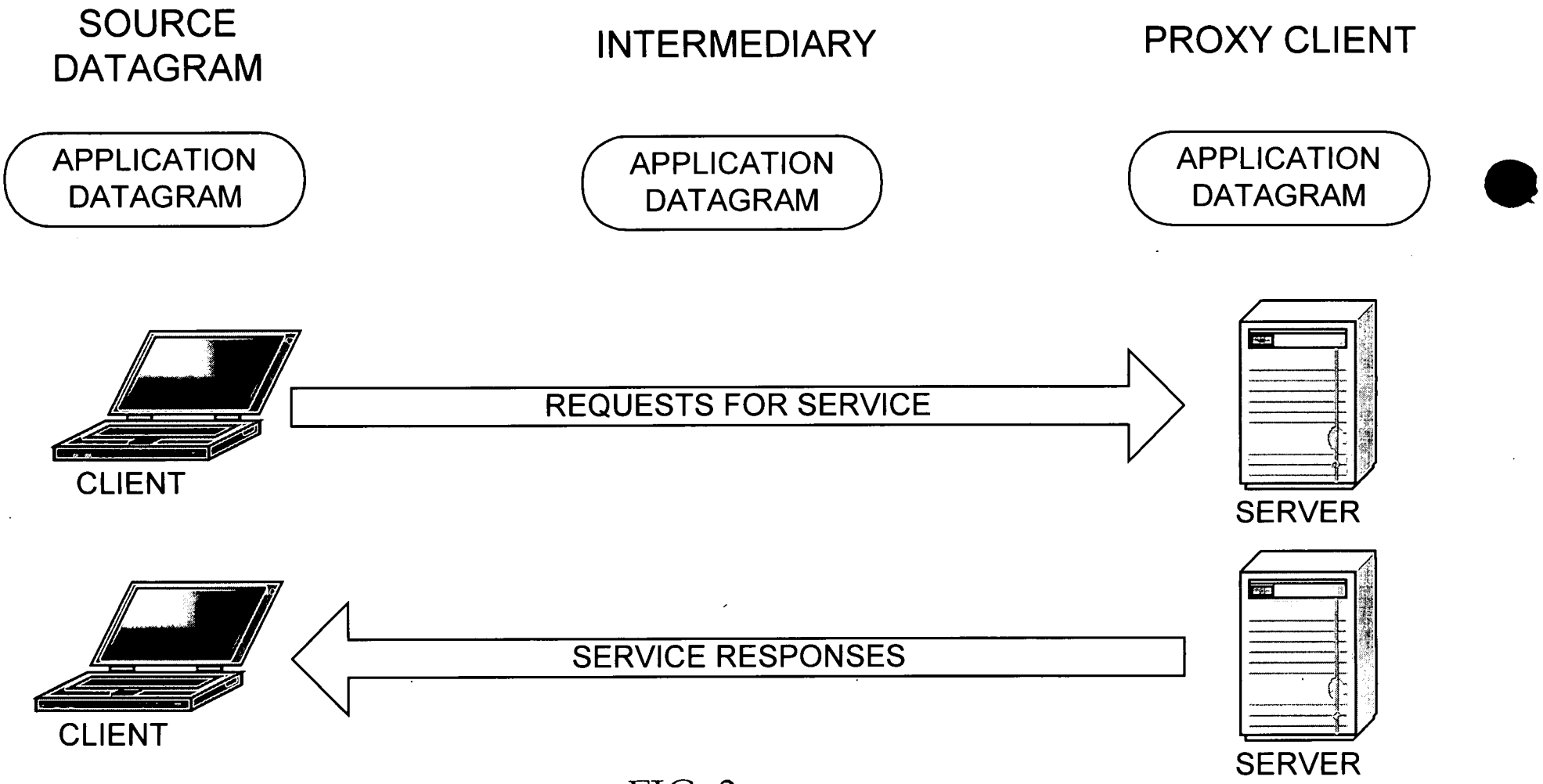
SOURCE DATAGRAM
INTERMEDIARY
PROXY CLIENT
APPLICATION DATAGRAM
APPLICATION DATAGRAM
APPLICATION DATAGRAM
REQUESTS FOR SERVICE
CLIENT
SERVER
SERVICE RESPONSES
CLIENT
SERVER

FIG. 2

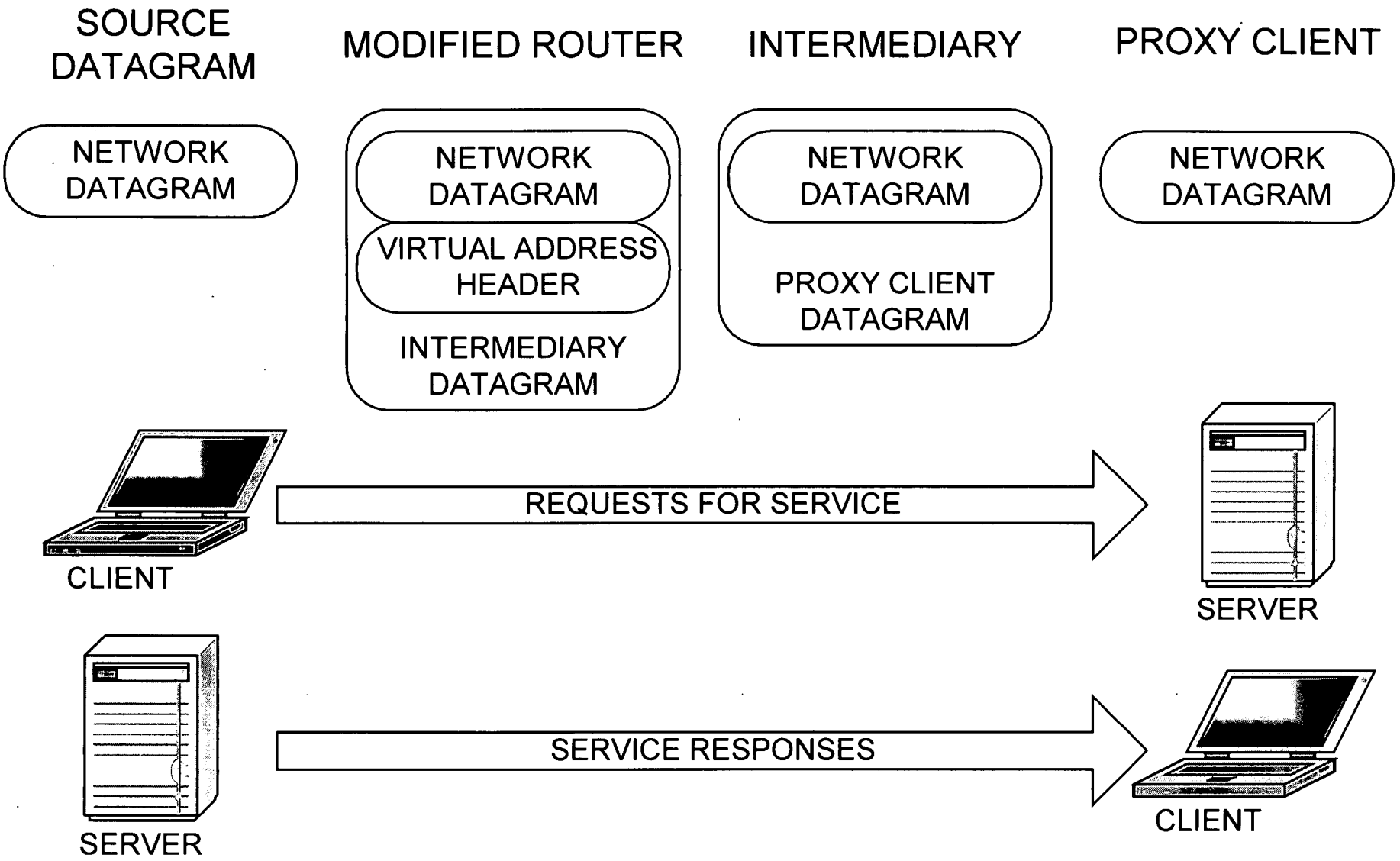
SOURCE DATAGRAM
MODIFIED ROUTER
INTERMEDIARY
PROXY CLIENT
NETWORK DATAGRAM
NETWORK DATAGRAM
VIRTUAL ADDRESS HEADER
INTERMEDIARY DATAGRAM
NETWORK DATAGRAM
PROXY CLIENT DATAGRAM
NETWORK DATAGRAM
REQUESTS FOR SERVICE
CLIENT
SERVER
SERVICE RESPONSES
SERVER
CLIENT

FIG. 3

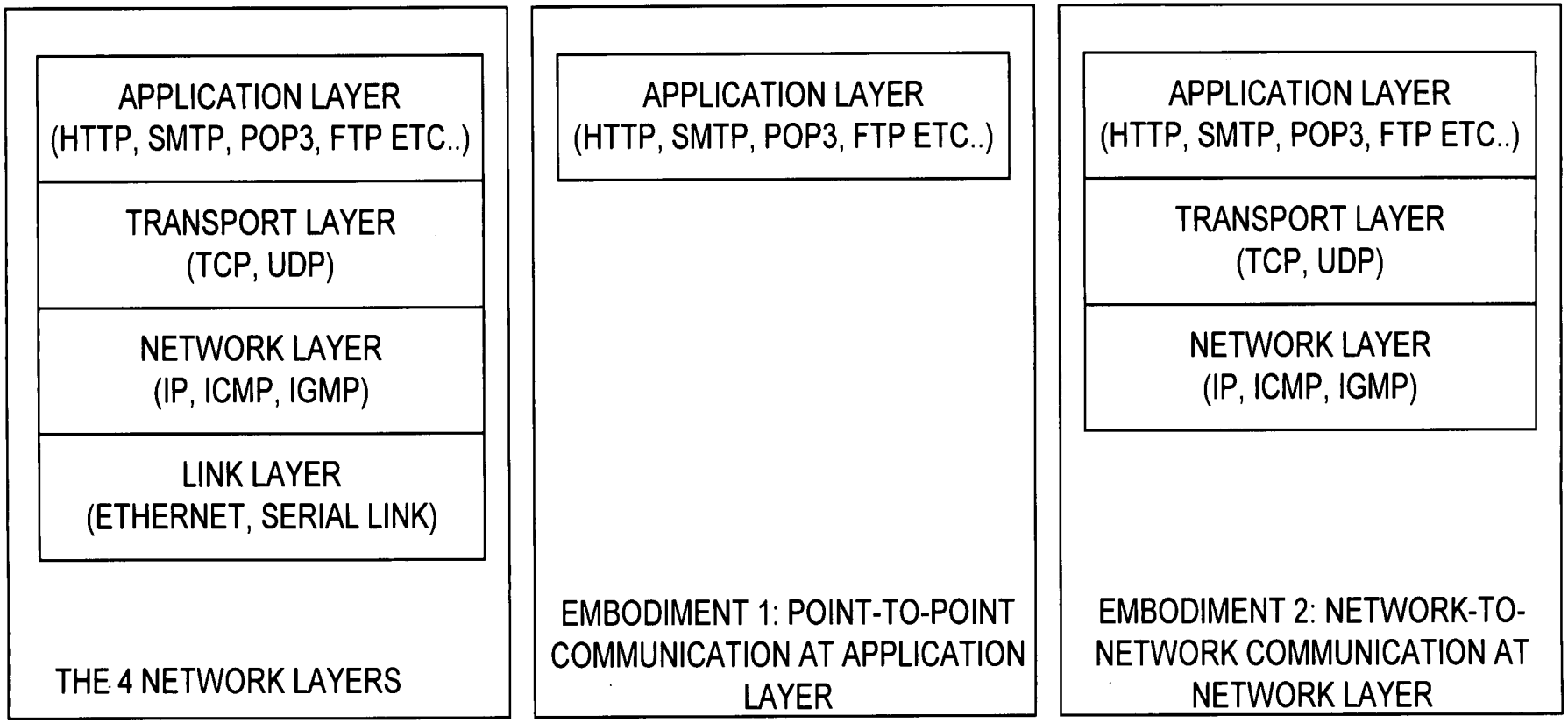
APPLICATION LAYER
(HTTP, SMTP, POP3, FTP ETC..)
TRANSPORT LAYER
(TCP, UDP)
NETWORK LAYER
(IP, ICMP, IGMP)
LINK LAYER
(ETHERNET, SERIAL LINK)
THE 4 NETWORK LAYERS
APPLICATION LAYER
(HTTP, SMTP, POP3, FTP ETC..)
EMBODIMENT 1: POINT-TO-POINT COMMUNICATION AT APPLICATION LAYER
APPLICATION LAYER
(HTTP, SMTP, POP3, FTP ETC..)
TRANSPORT LAYER
(TCP, UDP)
NETWORK LAYER
(IP, ICMP, IGMP)
EMBODIMENT 2: NETWORK-TO-NETWORK COMMUNICATION AT NETWORK LAYER

FIG. 4

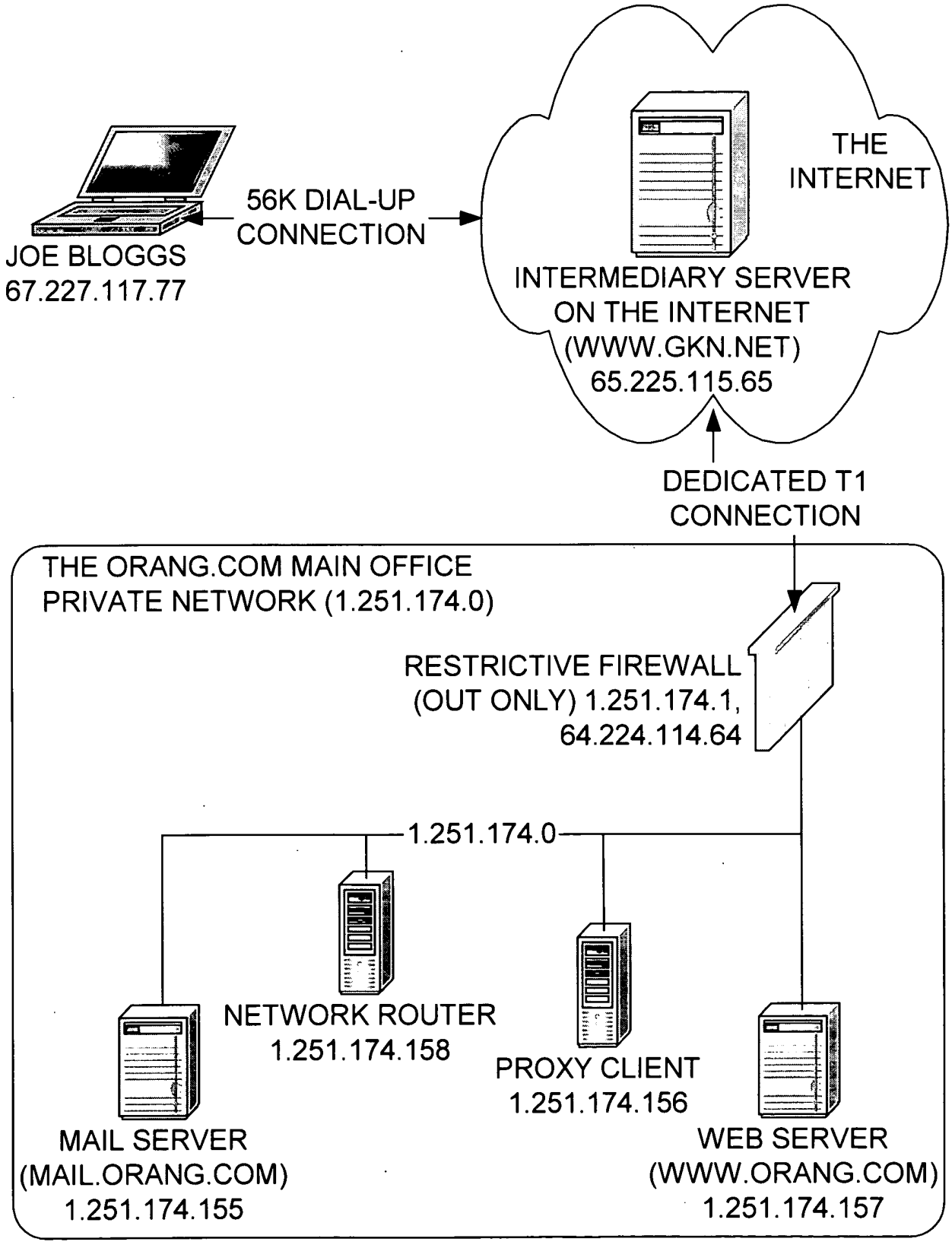
THE INTERNET
56K DIAL-UP CONNECTION
JOE BLOGGS
67.227.117.77
INTERMEDIARY SERVER ON THE INTERNET (WWW.GKN.NET) 65.225.115.65
DEDICATED T1 CONNECTION
THE ORANG.COM MAIN OFFICE PRIVATE NETWORK (1.251.174.0)
RESTRICTIVE FIREWALL (OUT ONLY) 1.251.174.1, 64.224.114.64
1.251.174.0
NETWORK ROUTER 1.251.174.158
PROXY CLIENT 1.251.174.156
MAIL SERVER (MAIL.ORANG.COM) 1.251.174.155
WEB SERVER (WWW.ORANG.COM) 1.251.174.157

FIG. 5

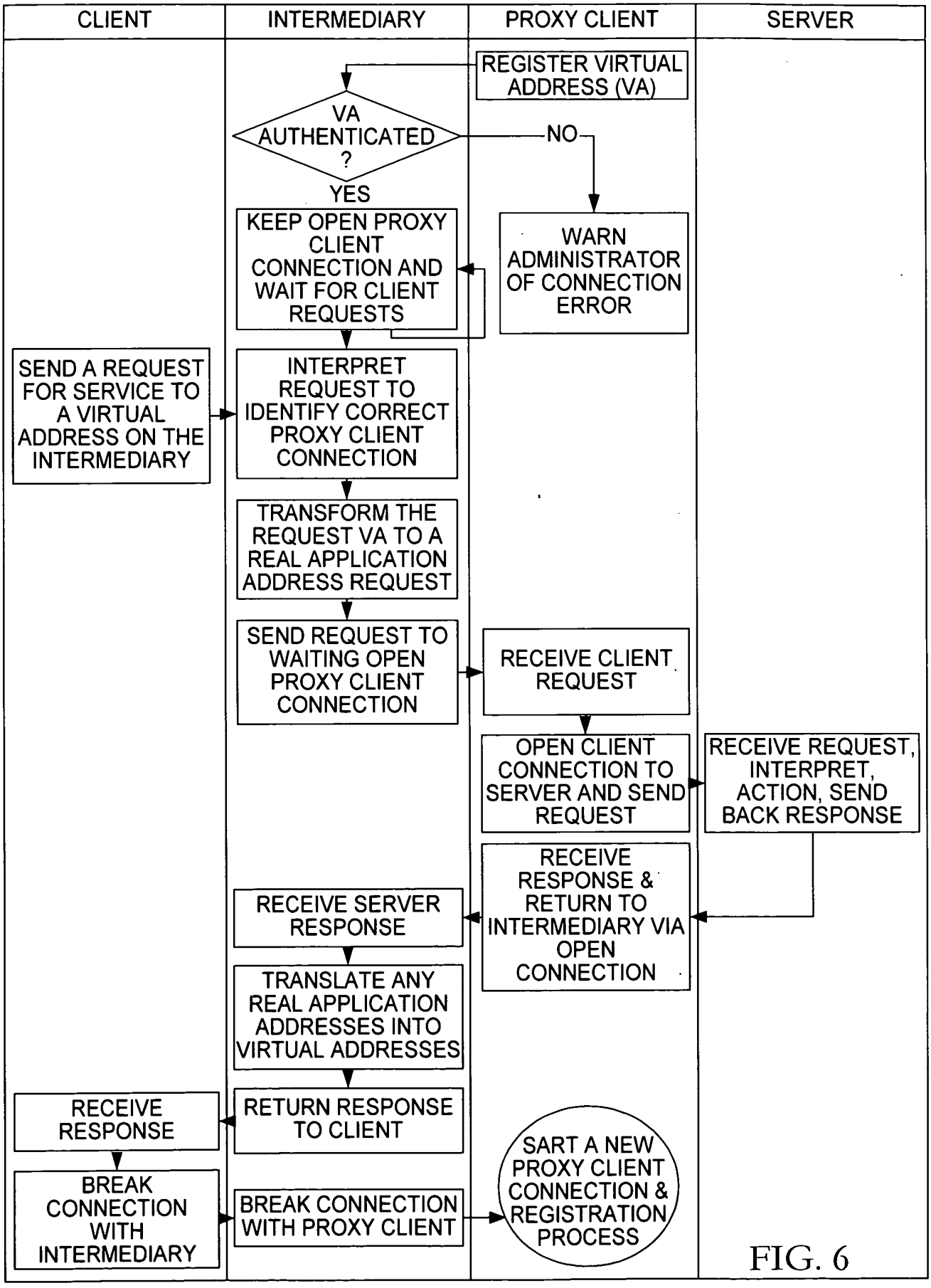
CLIENT
INTERMEDIARY
PROXY CLIENT
SERVER
REGISTER VIRTUAL ADDRESS (VA)
VA AUTHENTICATED ?
NO
YES
KEEP OPEN PROXY CLIENT CONNECTION AND WAIT FOR CLIENT REQUESTS
WARN ADMINISTRATOR OF CONNECTION ERROR
SEND A REQUEST FOR SERVICE TO A VIRTUAL ADDRESS ON THE INTERMEDIARY
INTERPRET REQUEST TO IDENTIFY CORRECT PROXY CLIENT CONNECTION
TRANSFORM THE REQUEST VA TO A REAL APPLICATION ADDRESS REQUEST
SEND REQUEST TO WAITING OPEN PROXY CLIENT CONNECTION
RECEIVE CLIENT REQUEST
OPEN CLIENT CONNECTION TO SERVER AND SEND REQUEST
RECEIVE REQUEST, INTERPRET, ACTION, SEND BACK RESPONSE
RECEIVE RESPONSE & RETURN TO INTERMEDIARY VIA OPEN CONNECTION
RECEIVE SERVER RESPONSE
TRANSLATE ANY REAL APPLICATION ADDRESSES INTO VIRTUAL ADDRESSES
RECEIVE RESPONSE
RETURN RESPONSE TO CLIENT
BREAK CONNECTION WITH INTERMEDIARY
BREAK CONNECTION WITH PROXY CLIENT
SART A NEW PROXY CLIENT CONNECTION & REGISTRATION PROCESS

FIG. 6

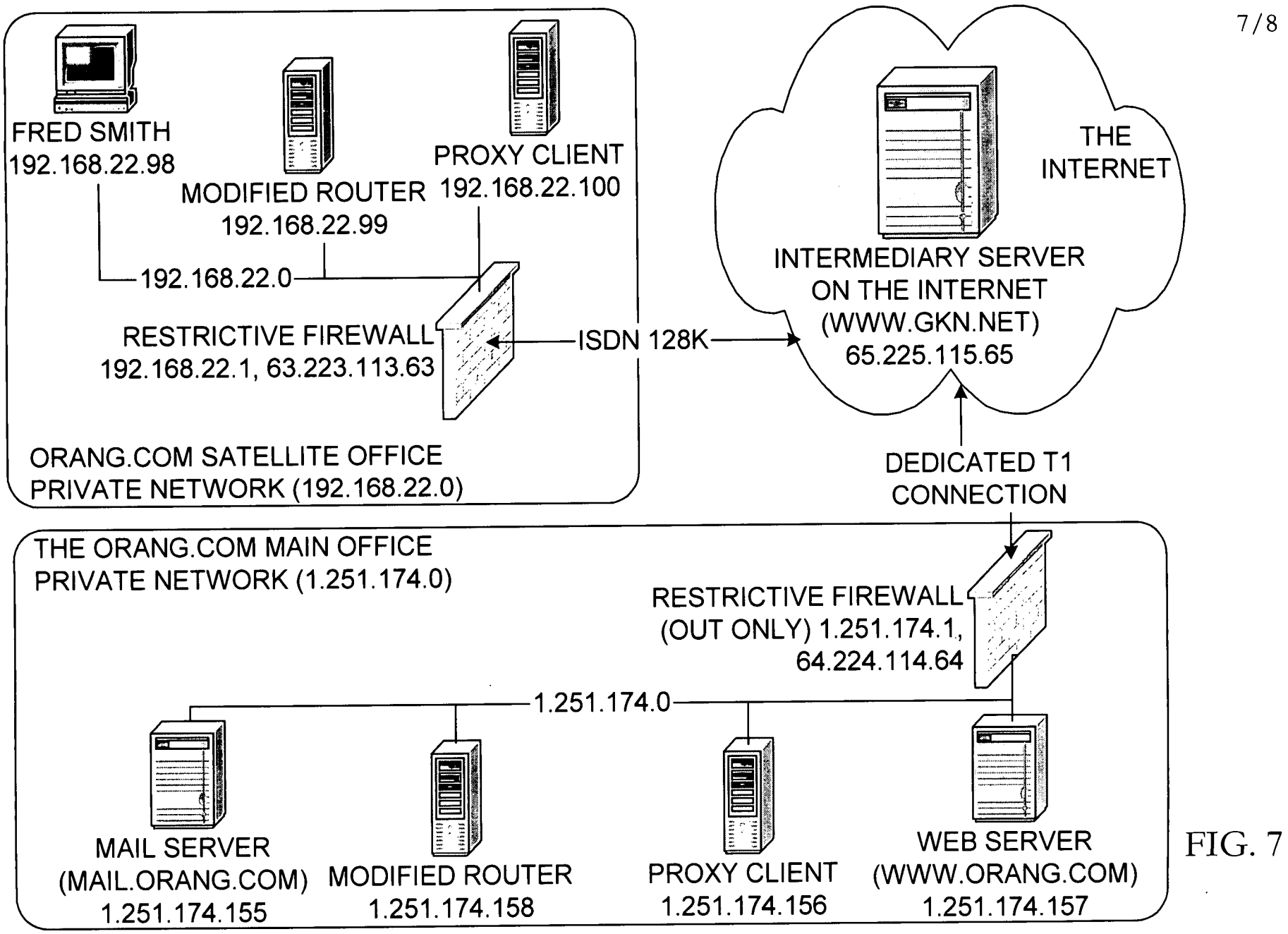
FRED SMITH
192.168.22.98
MODIFIED ROUTER
192.168.22.99
PROXY CLIENT
192.168.22.100
192.168.22.0
RESTRICTIVE FIREWALL
192.168.22.1, 63.223.113.63
ISDN 128K
ORANG.COM SATELLITE OFFICE
PRIVATE NETWORK (192.168.22.0)
THE
INTERNET
INTERMEDIARY SERVER
ON THE INTERNET
(WWW.GKN.NET)
65.225.115.65
DEDICATED T1
CONNECTION
THE ORANG.COM MAIN OFFICE
PRIVATE NETWORK (1.251.174.0)
RESTRICTIVE FIREWALL
(OUT ONLY) 1.251.174.1,
64.224.114.64
1.251.174.0
MAIL SERVER
(MAIL.ORANG.COM)
1.251.174.155
MODIFIED ROUTER
1.251.174.158
PROXY CLIENT
1.251.174.156
WEB SERVER
(WWW.ORANG.COM)
1.251.174.157

FIG. 7

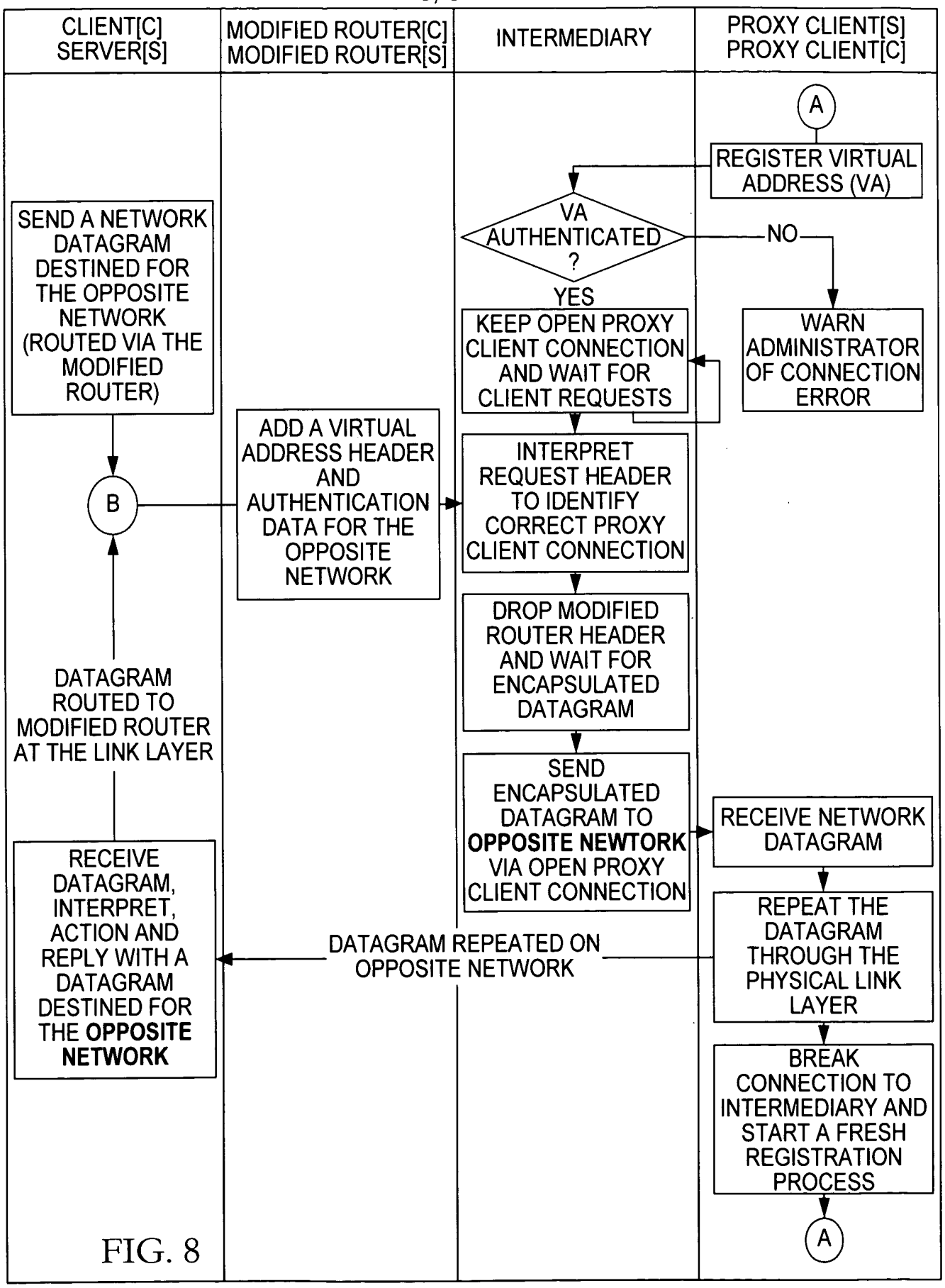
CLIENT[C]
SERVER[S]
MODIFIED ROUTER[C]
MODIFIED ROUTER[S]
INTERMEDIARY
PROXY CLIENT[S]
PROXY CLIENT[C]
A
REGISTER VIRTUAL ADDRESS (VA)
VA AUTHENTICATED ?
NO
YES
WARN ADMINISTRATOR OF CONNECTION ERROR
KEEP OPEN PROXY CLIENT CONNECTION AND WAIT FOR CLIENT REQUESTS
SEND A NETWORK DATAGRAM DESTINED FOR THE OPPOSITE NETWORK (ROUTED VIA THE MODIFIED ROUTER)
ADD A VIRTUAL ADDRESS HEADER AND AUTHENTICATION DATA FOR THE OPPOSITE NETWORK
B
INTERPRET REQUEST HEADER TO IDENTIFY CORRECT PROXY CLIENT CONNECTION
DROP MODIFIED ROUTER HEADER AND WAIT FOR ENCAPSULATED DATAGRAM
DATAGRAM ROUTED TO MODIFIED ROUTER AT THE LINK LAYER
SEND ENCAPSULATED DATAGRAM TO **OPPOSITE NEWTORK** VIA OPEN PROXY CLIENT CONNECTION
RECEIVE NETWORK DATAGRAM
RECEIVE DATAGRAM, INTERPRET, ACTION AND REPLY WITH A DATAGRAM DESTINED FOR THE **OPPOSITE NETWORK**
DATAGRAM REPEATED ON OPPOSITE NETWORK
REPEAT THE DATAGRAM THROUGH THE PHYSICAL LINK LAYER
BREAK CONNECTION TO INTERMEDIARY AND START A FRESH REGISTRATION PROCESS
A

FIG. 8